

IN THE CLAIMS

1. (currently amended) A process for examining of membrane enclosed biocompartments (1), wherein the biocompartments (1) are ~~made ready~~ arranged in a micro-flow chamber (2) which includes an operational electrode (19) for placing the biocompartments (1) in proximity thereto and a reference electrode (20) separated from the operational electrode (19); which the micro-flow chamber (2) is subject to through-flow of a culture medium containing an agent which can affect the biocompartments (1), the medium being in contact with the biocompartments (1) whereby a concentration of a substance is released by and/or consumed by metabolic action into and/or from a portion of a culture medium contained in an activity area of the biocompartment (1), and wherein the pH value of that portion of the culture medium which is found within the micro-flow chamber (2) is measured to determine a metabolic activity of the biocompartment, the process comprising:

a) ~~indirectly measuring a concentration of a substance in a portion of a culture medium, the substance being released by and/or consumed by metabolic action into and/or from a portion of a culture medium contained in an activity area of the biocompartment (1), while between an operating electrode (19) placed in the activity area and a reference electrode (20) separated from said operating electrode (19), an electrical potential~~ applying a voltage is applied to the culture medium (1)

so that hydroxyl ions or hydrogen ions are formed from the substance in the culture medium;

b) at a measuring location in the portion of the culture medium, prior to or during the application of the ~~said electrical potential~~ voltage, measuring at least a first ~~measured~~ measurement value (pH_{-1} , pH_{-3} or pH_{+1} , ~~[[pH_{-3}]]~~ pH_{+3}) for a pH value of the culture medium;

c) subsequently switching off or changing the ~~electrical potential~~ voltage so that the formation of hydroxyl and hydrogen ions from the substance is stopped[[.]];

d) ~~shortly~~ before or after measurement of the first measurement value[[s]], (pH_{-1} , pH_{-3} or pH_{+1} , pH_{+3}), upon switching off or changing the voltage ~~electrical potential, or in the case of existing potential, or by a potential under which~~ such that the formation of hydroxyl and hydrogen ions from the ~~said~~ substance is repressed, taking at least one second measurement value[[,]] ~~namely~~ (pH_{-2} , pH_{-4} or pH_{+2} , pH_{+4}) for the pH value of the culture medium;

e) calculating a difference ~~from~~ between the first measurement value (pH_{-1} , pH_{-3} or pH_{+1} , pH_{+3}) and ~~from~~ the second measurement value[[s]] (pH_{-2} , pH_{-4} or pH_{+2} , pH_{+4}), to produce a measurement value difference (ΔpH_{-21} , ΔpH_{-43} or ΔpH_{+21} , ΔpH_{+43});

f) repeating the steps a) to e) at least once;

g) calculating a ~~from the~~ difference between at least two of the ~~these~~ ~~measured~~ measurement value differences~~[[,]]~~ (ΔpH_{-21} , ΔpH_{-43} or ΔpH_{+21} , ΔpH_{+43}) to determine ~~determining~~ a concentration change of the substance in the culture medium~~[[,]]~~; and ~~from the~~ calculating a difference between at least two of the first ~~measured~~ measurement pH values (pH_{-1} , pH_{-3} or pH_{+1} , pH_{+3}) and/or calculating a difference between at least two of the second ~~measured~~ measurement pH values (pH_{-2} , pH_{-4} or pH_{+2} , pH_{+4}) to determine ~~determining the~~ an acidification or the alkalization of the culture medium; and

h) from the ~~so-acquired~~ measurement values for the concentration change and the acidification or the alkalization, determining the metabolic activity of the biocompartments (1).

2. (original) A process in accordance with Claim 1, wherein the sequence comprised of the steps a) to g) is run through at least twice, and that in accordance with this repetition, the electrical polarity applied between the operational electrode (19) and the reference electrode (20) is selected on a changeable basis.

3. (currently amended) A process in accordance with Claim 1, wherein a time for the measurement of the ~~pH-measured~~ measurement values (pH_{-1} , pH_{-2} , pH_{-3} , pH_{-4} , or pH_{+1} , pH_{+2} , pH_{+3} , pH_{+4}) is adjusted to coincide with a time at which the

~~electrical potential~~ voltage is changed or switched off, and the hydrogen ion and hydroxy ion concentrations in the culture medium are generally in balance.

4. (currently amended) A process in accordance with Claim 1, wherein a time interval between the respective times of the application, the switching off or change in the ~~electrical potential~~ voltage, and ~~the a~~ subsequent time in which a ~~pH~~ the measurement value (pH₋₁, pH₋₂, pH₋₃, pH₋₄, or pH₊₁, pH₊₂ pH₊₃, pH₊₄) is measured, are approximately the same at all pH measurement values (pH₋₁, pH₋₂, pH₋₃, pH₋₄, or pH₊₁, pH₊₂ pH₊₃, pH₊₄).

5. (currently amended) A process in accordance with Claim 1, wherein the ~~electrical potential~~ voltage is switched off, or, in accordance with Step c, is changed, before an equilibrium state of the hydrogen and hydroxyl ion concentrations has established itself in the culture medium.

6. (original) A process in accordance with Claim 1, further comprising measuring the flowing electric electrode current between the operational electrode (19) and the reference electrode (20).

7. (original) A process in accordance with Claim 1, wherein the biocompartments (1) are installed in such a manner on the operational electrode (19), that, area-wise, they partially cover the electrode (19) and that from the applied voltage between the operational electrode (19) and the reference electrode (20) on the electrode current, the morphology of the biocompartments (1) can be determined.

8. (currently amended) A process in accordance with Claim 1, wherein the through-flow of the culture medium is halted or at least reduced during and between the times of acquiring of the first and last pH measurement values of ~~the~~ a measured pH value series for a determination of a concentration change of the substance in the culture medium and the acidification or the alkalization thereof.

9. (currently amended) A process in accordance with Claim 1, wherein between the determination of the first and last pH measurement values of ~~the~~ a pH value series of measurements, the buffer capacity of the culture medium is held constant.

10. (new) A process for examining membrane enclosed biocompartments (1), wherein the biocompartments (1) are arranged in a chamber which includes an

operational electrode (19) for placing the biocompartments (1) in proximity thereto and a reference electrode (20) separated from the operational electrode (19); the chamber is subject to through-flow of a culture medium containing an agent which can affect the biocompartments (1), the medium being in contact with the biocompartments (1) whereby a concentration of a substance is released by and/or consumed by metabolic action into and/or from a portion of a culture medium contained in an activity area of the biocompartment (1), and wherein the pH value of that portion of the culture medium which is found within the chamber (2) is measured to determine a metabolic activity of the biocompartment, the process comprising:

a) applying a voltage to the culture medium (1) so that hydroxyl ions or hydrogen ions are formed from the substance in the culture medium;

b) at a measuring location in the portion of the culture medium, during the application of the voltage, measuring at least a first measurement value (pH_{-1} , pH_{-3} or pH_{+1} , pH_{+3}) for a pH value of the culture medium;

c) subsequently switching off or changing the voltage so that the formation of hydroxyl and hydrogen ions from the substance is stopped;

d) before or after measurement of the first measurement value (pH_{-1} , pH_{-3} or pH_{+1} , pH_{+3}), upon switching off or changing the voltage such that the formation of hydroxyl and hydrogen ions from the substance is repressed, taking at least one

second measurement value (pH_{-2} , pH_{-4} or pH_{+2} , pH_{+4}) for the pH value of the culture medium;

e) calculating a difference between the first measurement value (pH_{-1} , pH_{-3} or pH_{+1} , pH_{+3}) and the second measurement value (pH_{-2} , pH_{-4} or pH_{+2} , pH_{+4}), to produce a measurement value difference (ΔpH_{-21} , ΔpH_{-43} or ΔpH_{+21} , ΔpH_{+43});

f) repeating the steps a) to e) at least once;

g) calculating a difference between at least two of the measurement value differences (ΔpH_{-21} , ΔpH_{-43} or ΔpH_{+21} , ΔpH_{+43}) to determine a concentration change of the substance in the culture medium; and calculating a difference between at least two of the first measurement values (pH_{-1} , pH_{-3} or pH_{+1} , pH_{+3}) and/or calculating a difference between at least two of the second measurement values (pH_{-2} , pH_{-4} or pH_{+2} , pH_{+4}) to determine an acidification or alkalization of the culture medium; and

h) from the measurement values for the concentration change and the acidification or the alkalization, determining the metabolic activity of the biocompartments (1).